

Analysis and Research on the Present Situation and Fairness of Resource Allocation of Pension Institutions in Southwest China

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Abstract

Based on the panel data of five provinces and cities in Southwest China from 2019 to 2023, this study uses Gini coefficient and Theil index to evaluate the fairness of resource allocation of pension institutions in five provinces (cities, districts) in Southwest China from two dimensions of population and geography. The results show that the Gini coefficient of resources allocated according to the elderly population is mostly lower than 0.2, which is in a highly fair range, in which the number of institutions and beds is the most balanced, and the unfairness of professional and technical personnel allocation is improving year by year; Theil index analysis shows that the fairness of resource allocation is continuously optimized, and the imbalance of human resource allocation is gradually alleviated. The research shows that the allocation of resources for the aged institutions in Southwest China is fair according to the population, and the distribution of resources and the elderly population basically matches, but the layout of human resources still needs to be further optimized to ensure the accurate docking of service demand.

Keywords

Allocation of Endowment Resources; Elderly Care Service; Southwest of China; Gini Coefficient.

1. Introduction

Report to the 20th CPC National Congress of the Party emphasized: "Implement the national strategy of actively responding to the aging population, develop the old-age care undertakings and industries, optimize the services for the elderly who are lonely, and promote the realization of basic old-age care services for all the elderly." With the continuous acceleration of China's population aging process, actively responding to population aging has risen to the national strategic height [1]. Southwest China, as an important geographical and population region in China, is characterized by its rapid aging process, large base and unbalanced regional development, which makes the construction of the old-age service system in this region face severe challenges [2]. As an important support of socialized old-age care service system, the rationality and fairness of its resource allocation are directly related to the accessibility and quality of regional old-age care services. At present, the systematic research on the allocation of old-age resources in specific regions, especially the exploration of combining the status quo and fairness analysis, is still insufficient. This study focuses on the southwest region, aiming at systematically analyzing the current situation of resource allocation of pension institutions in this region and evaluating the fairness of its allocation by scientific methods. The research results aim to provide empirical basis and decision-making reference for the development planning of the old-age care in the tenth five-year plan period, so as to promote the optimization of resource allocation and ultimately improve the overall efficiency and service quality of the old-age care service system.

2. Research Design

2.1. Index Selection and Data Source

this study selects six indicators to evaluate the resource allocation level of old-age care institutions: the number of elderly people aged 65 and above, the number of old-age care institutions, the number of beds at the end of the year, the number of managers, the number of professional and technical personnel and the building area of institutions. The indicator data comes from China Statistical Yearbook and China Civil Affairs Statistical Yearbook from 2019 to 2023.

2.2. Research Methods.

2.2.1. Lorenz Curve

Lorenz curve is mainly used to study the income equity, and is also widely used to evaluate the equity of the allocation of pension resources and health resources[3][4]. The curve is drawn with the cumulative percentage of population (or geographical area) as the horizontal axis and the cumulative percentage of resources (such as beds in old-age care institutions and health technicians, etc.) as the vertical axis. The diagonal line of $y=x$ represents the ideal state of absolute fairness, that is, resources are completely distributed in proportion to population or area. The deviation between the actually drawn Lorenz curve and this absolute fairness line directly reflects the inequality of resource allocation. The greater the curvature of the curve, the more concentrated the resource allocation is in a few areas or people, the worse the fairness is; On the contrary, the smaller the curve radian, the more balanced the resource allocation and the higher the fairness.

2.2.2. Gini Coefficient

Gini coefficient is a commonly used index to measure the fairness of resource allocation[3][4], and G is equal to the ratio of the area surrounded by Lorenz curve and absolute fairness line to the area of right triangle below absolute fairness line. Use formula (1) to calculate G .

$$G=1-\sum_{i=1}^n(x_i-x_{i+1})(y_i+y_{i+1}). \quad (1)$$

This formula is based on the geometric method to measure the fairness of resource allocation. In the formula, x_i represents the cumulative percentage of population (geographical area) from group 1 to group i , and y_i represents the corresponding cumulative percentage of old-age resources. The value range of g is between 0 and 1, and the closer the value is to 0, the fairer the resource allocation is; The closer the value is to 1, the worse the fairness is. It is generally believed that g less than 0.2 represents absolute fairness; 0.2 to 0.3 is fair; Between 0.3 and 0.4 is relatively fair; Between 0.4 and 0.5 is relatively unfair; > 0.5 is very unfair.

2.2.3. Theil Index

Theil index (t) is an important indicator to measure the fairness of resource allocation, and its value is negatively correlated with fairness, that is, the greater the index value, the higher the unfairness. Formula (2) is used to calculate T .

$$T = \sum_{i=1}^n \frac{y_i}{Y} \times \ln \left[\frac{(y_i/Y)}{(x_i/X)} \right]. \quad (2)$$

Among them, y_i is the amount of endowment resources in the i -th region (such as the number of endowment institutions and beds, etc.), and Y is the total amount of resources in the research region; x_i is the allocation base value of the i -th region (such as the number of elderly people or

geographical area), and X is the allocation base total; $\ln$ is the natural logarithm. The greater the t value, the more unfair the resource allocation. The advantage of this index is that it can decompose the overall unfairness, so as to identify whether the source of differences is mainly within or between regions. In this study, each province in Southwest China is a region, and two factors, population and geographical area, need to be considered. Therefore, we only need to calculate the total theil index according to the allocation data of population and geographical area respectively, so as to judge the fairness of resource allocation of pension institutions in Southwest China[3].

2.2.4. Statistical Analysis Technique

Using WPS 2019 to calculate Gini coefficient and Theil index, and draw Lorenz curve for visual analysis.

3. Research Result

3.1. Present Situation of Resource Allocation of Old-Age Care Institutions in Southwest China

Referring to the relevant literature (remarks related literature), this study selects six indicators to evaluate the resource allocation level of old-age care institutions: the number of elderly people aged 65 and above, the number of old-age care institutions, the number of beds at the end of the year, the number of managers, the number of professional and technical personnel and the building area of institutions. The indicator data comes from China Statistical Yearbook and China Civil Affairs Statistical Yearbook from 2019 to 2023.

3.1.1. Total Resource Allocation

Table 1. Allocation of main resources of old-age care institutions in Southwest China from 2019 to 2023

Time	Province	Number of institutions for the aged (pcs)	Number of beds at year end (pcs)	Number of managers(No.)	Number of professional personnel(No.)	Institutional building area (sq. m.)
2019	Xizang Autonomous Region	8	3118	27	109	26575
	Guizhou	939	75966	3205	2856	1865235
	Yunnan	837	81110	1655	4992	2693469
	Chongqing	903	97435	3153	8057	2034262
	Sichuan	2436	293830	9094	10670	5907183
2020	Xizang Autonomous Region	23	4160	84	349	128088
	Guizhou	988	84344	3139	3592	2086672
	Yunnan	880	89142	1776	5891	2358663
	Chongqing	927	102560	3278	8805	2847128
	Sichuan	2541	297638	9197	12005	6417326
2021	Xizang Autonomous Region	59	9105	256	673	456305
	Guizhou	1002	85280	2527	4578	2113775
	Yunnan	903	92236	2156	7137	2580121
	Chongqing	1145	121983	3994	10684	3410122
	Sichuan	2504	297340	8819	14940	7229999
2022	Xizang Autonomous Region	70	10751	360	961	520728
	Guizhou	938	83281	2753	4923	2160420
	Yunnan	899	94163	2321	7255	2723702
	Chongqing	1197	125079	3914	10960	3541659
	Sichuan	2553	316115	9049	17204	8431585
2023	Xizang Autonomous Region	73	11631	335	1152	555299
	Guizhou	896	81694	2782	5894	2321570
	Yunnan	904	98381	2383	7431	2853928
	Chongqing	1223	127751	4263	11647	3830117
	Sichuan	2587	323992	10067	21861	9916920

From 2019 to 2023, the total resources of old-age care institutions in southwest China showed an overall growth trend, but the regional differences were obvious. Sichuan Province always ranks first in terms of the number of institutions, beds, personnel and building area, while Chongqing's various indicators have grown rapidly, and the number of beds and the expansion of professional and technical personnel are more prominent. Yunnan and Guizhou are in the middle level, and the scale of resources is close to but obviously lower than that of Sichuan and Chongqing. Xizang's total amount is the smallest, but it has increased greatly in recent years. Generally speaking, the resources for the aged in Southwest China are characterized by continuous growth and regional agglomeration, and the resources are mainly concentrated in Sichuan and Chongqing. See Table 1 for details.

3.1.2. Resource Allocation Per Thousand Elderly People

According to the calculation of the elderly population, the fairness of resources in southwest China is good, but there are still some differences between regions. The number of beds per thousand elderly people in Sichuan and Chongqing has remained at a high level for a long time, indicating that they have strong supply capacity of old-age services; Yunnan and Guizhou are relatively low, especially in Guizhou, which shows that demand growth is faster than resource expansion. Although the total amount of Xizang is relatively small, the per capita bed and personnel index have improved most obviously because of the low population base of the elderly. See Table 2 for details.

Table 2. Allocation of resources per thousand old-age care institutions in Southwest China from 2019 to 2023.

Time	Province	Number of institutions for the aged (pcs)	Number of beds at year end (pcs)	Number of managers(No.)	Number of professional personnel(No.)	Institutional building area (sq. m.)
2019	Xizang Autonomous Region	0.04	14.40	0.12	0.50	122.69
	Guizhou	0.21	17.05	0.72	0.64	418.59
	Yunnan	0.18	17.38	0.35	1.07	577.15
	Chongqing	0.18	19.91	0.64	1.65	415.70
	Sichuan	0.19	22.35	0.69	0.81	449.40
2020	Xizang Autonomous Region	0.11	20.10	0.41	1.69	618.89
	Guizhou	0.22	18.93	0.70	0.81	468.24
	Yunnan	0.17	17.57	0.35	1.16	464.92
	Chongqing	0.17	18.74	0.60	1.61	520.16
	Sichuan	0.18	21.01	0.65	0.85	452.96
2021	Xizang Autonomous Region	0.28	42.89	1.21	3.17	2149.54
	Guizhou	0.22	18.83	0.56	1.01	466.62
	Yunnan	0.17	17.45	0.41	1.35	488.14
	Chongqing	0.20	21.38	0.70	1.87	597.79
	Sichuan	0.17	20.20	0.60	1.02	491.24
2022	Xizang Autonomous Region	0.33	50.06	1.68	4.47	2424.70
	Guizhou	0.20	17.82	0.59	1.05	462.27
	Yunnan	0.16	17.19	0.42	1.32	497.32
	Chongqing	0.20	21.27	0.67	1.86	602.34
	Sichuan	0.17	20.83	0.60	1.13	555.67
2023	Xizang Autonomous Region	0.33	52.32	1.51	5.18	2498.14
	Guizhou	0.18	16.49	0.56	1.19	468.54
	Yunnan	0.16	17.62	0.43	1.33	511.07
	Chongqing	0.20	21.17	0.71	1.93	634.74
	Sichuan	0.17	20.97	0.65	1.42	641.98

3.1.3. Resource Allocation Per Thousand Square Kilometers

When measured by geographical area, the difference in the allocation of old-age resources in southwest China has expanded significantly. The average number of institutions and beds in Chongqing is the highest over the years, while Sichuan ranks second, Guizhou and Yunnan are in the middle level, while Xizang has the lowest for a long time. Although Xizang's per capita resources have improved in recent years, there is still a big gap compared with Chongqing and Sichuan. It shows that the spatial distribution of old-age care resources in southwest China has obvious characteristics of "dense in the east and sparse in the west", and the imbalance problem is more prominent. See table 3 for details.

Table 3. Resource allocation of old-age care institutions per thousand square kilometers in Southwest China from 2019 to 2023.

Time	Province	Number of institutions for the aged (pcs)	Number of beds at year end (pcs)	Number of managers(No.)	Number of professional personnel(No.)	Institutional building area (sq. m.)
2019	Xizang Autonomous Region	0.01	2.59	0.02	0.09	22.09
	Guizhou	5.33	431.14	18.19	16.21	10585.90
	Yunnan	2.12	205.81	4.20	12.67	6834.48
	Chongqing	10.96	1182.46	38.26	97.78	24687.65
	Sichuan	5.01	604.46	18.71	21.95	12152.20
2020	Xizang Autonomous Region	0.02	3.46	0.07	0.29	106.49
	Guizhou	5.61	478.68	17.81	20.39	11842.63
	Yunnan	2.23	226.19	4.51	14.95	5984.94
	Chongqing	11.25	1244.66	39.78	106.86	34552.52
	Sichuan	5.23	612.30	18.92	24.70	13201.66
2021	Xizang Autonomous Region	0.05	7.57	0.21	0.56	379.37
	Guizhou	5.69	484.00	14.34	25.98	11996.45
	Yunnan	2.29	234.04	5.47	18.11	6546.87
	Chongqing	13.90	1480.38	48.47	129.66	41384.98
	Sichuan	5.15	611.68	18.14	30.73	14873.48
2022	Xizang Autonomous Region	0.06	8.94	0.30	0.80	432.93
	Guizhou	5.32	472.65	15.62	27.94	12261.18
	Yunnan	2.28	238.93	5.89	18.41	6911.20
	Chongqing	14.53	1517.95	47.50	133.01	42981.30
	Sichuan	5.25	650.31	18.62	35.39	17345.37
2023	Xizang Autonomous Region	0.06	9.67	0.28	0.96	461.67
	Guizhou	5.09	463.64	15.79	33.45	13175.77
	Yunnan	2.29	249.63	6.05	18.86	7241.63
	Chongqing	14.84	1550.38	51.74	141.35	46482.00
	Sichuan	5.32	666.51	20.71	44.97	20400.99

3.2. Analysis on the Equity of Resource Allocation of Pension Institutions in Southwest China

3.2.1. Fairness Analysis of Lorenz Curve

Judging from the Lorenz curve drawn by the elderly population and geographical area, the fairness of resource allocation in the old-age care institutions in southwest China shows obvious characteristics of population dimension fairness and geographical dimension imbalance.

The curve (Fig. 1 and Fig. 2) of the allocation of the elderly population is close to the absolute fairness line as a whole, indicating that the population allocation of the number of old-age care institutions and beds is fair, and the curve changes smoothly from 2019 to 2023, and the fairness remains stable. The curves according to the geographical area (Figs 3 and 4) deviate significantly from the fairness line, and the bending degree is obviously greater than that of the population dimension curve, which shows that the spatial distribution of resources is not fair, especially the geographical distribution imbalance of the number of beds is more prominent, which is directly related to the extremely low resource density in Xizang, Yunnan and other regions.

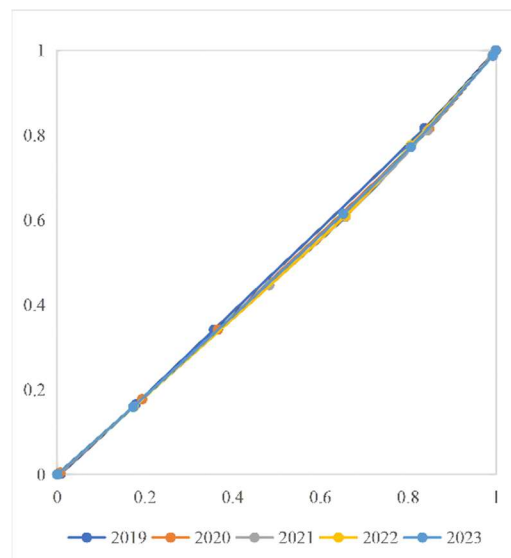


Fig. 1 Lorenz curve of the number of old-age care institutions allocated by population

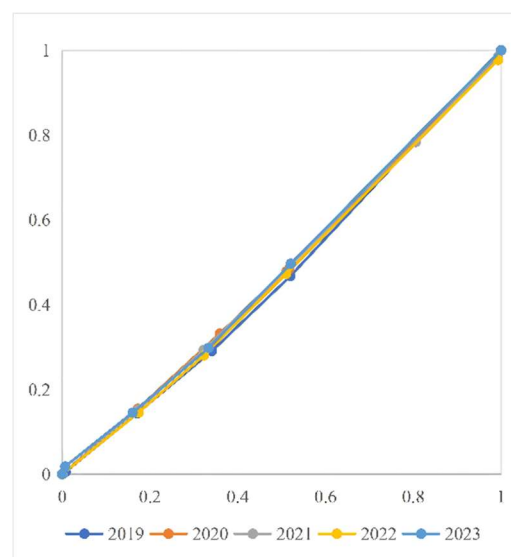


Fig. 2 Lorenz curve of bed number allocation according to local population

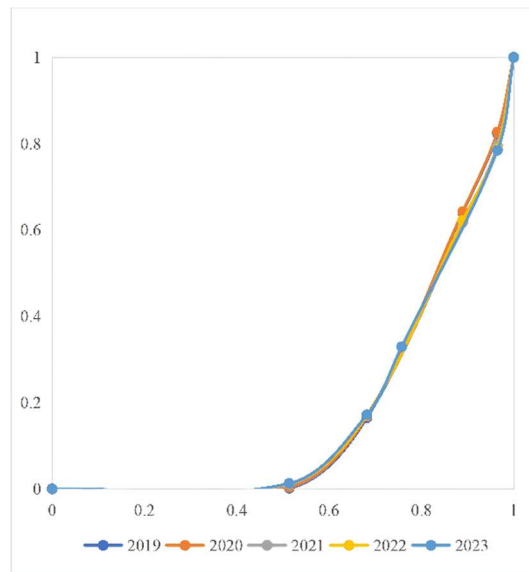


Fig. 3 Lorenz curve of the number of old-age care institutions allocated by geographical area

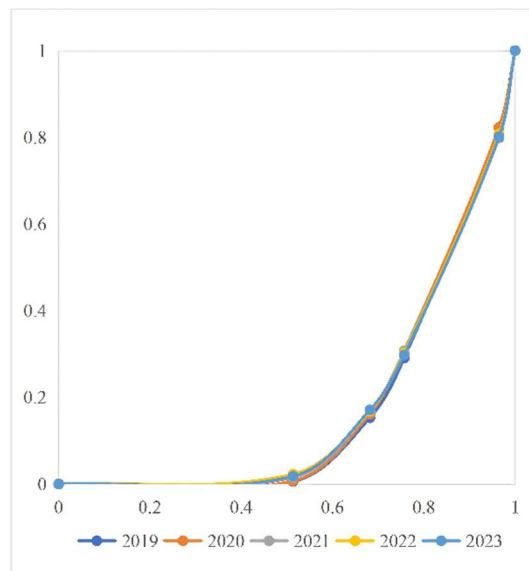


Fig. 4 Lorenz curve of the number of beds allocated by geographical area

From the perspective of time series changes, the shapes of the four types of curves have not changed significantly from 2019 to 2023, which shows that the equity pattern of the allocation of old-age resources in southwest China is relatively stable, and the imbalance of the allocation of geographical dimensions is still a long-standing core problem. In the future, we should focus on the optimization of spatial layout and narrow the resource density gap between regions.

3.2.2. Fairness Analysis of Lorenz Curve

In this study, the Gini coefficient of bed resource allocation in pension institutions in southwest China is calculated based on the distribution of the elderly population and geographical area. According to the population allocation of Theil index, according to the Gini coefficient of resources allocated by the aged population in Southwest China from 2019 to 2023, the number of old-age care institutions is 0.03~0.05, and the number of beds is 0.03~0.06, which is a highly fair range. Among them, the Gini coefficient of managers and professional technicians is slightly higher, which was 0.09 and 0.17 respectively in 2019, but it has improved year by year, showing that the allocation of human resources is gradually becoming fair. Generally speaking, the resource allocation according to population is fair, and the resource allocation basically

matches the distribution of the elderly population. From the analysis of Gini coefficient allocated by geographical area, from 2019 to 2023, the Gini coefficient of various resources in Southwest China is much higher than the warning line of 0.4. For example, the Gini coefficient of the number of old-age care institutions is stable at 0.63, and the number of beds is 0.57-0.64, which is a highly unfair interval. Among them, the Gini coefficient of managers and professional technicians is the highest, which is 0.77~0.81 and 0.74~0.77 respectively, and the building area of institutions is 0.73~0.75, which reflects the spatial agglomeration of human resources and infrastructure.

Table 4. Gini coefficient of allocating resources of old-age care institutions by population in Southwest China from 2019 to 2023.

Time	Number of institutions for the aged (pcs)	Number of beds at year end (pcs)	Number of managers(No.)	Number of professional personnel(No.)	Institutional building area (sq. m.)
2019	0.63	0.64	0.81	0.77	0.74
2020	0.63	0.63	0.79	0.75	0.75
2021	0.63	0.63	0.77	0.74	0.73
2022	0.63	0.63	0.77	0.74	0.74
2023	0.63	0.57	0.77	0.75	0.75

Table 5. Gini coefficient of allocation of resources of old-age care institutions by geographical area in Southwest China from 2019 to 2023.

Time	Number of institutions for the aged (pcs)	Number of beds at year end (pcs)	Number of managers(No.)	Number of professional personnel(No.)	Institutional building area (sq. m.)
2019	0.63	0.64	0.81	0.77	0.74
2020	0.63	0.63	0.79	0.75	0.75
2021	0.63	0.63	0.77	0.74	0.73
2022	0.63	0.63	0.77	0.74	0.74
2023	0.63	0.57	0.77	0.75	0.75

Generally speaking, the distribution of resources by geographical area is extremely unfair, and resources are highly concentrated in densely populated and economically developed areas such as Chongqing and Sichuan, while Xizang and Yunnan, which are vast and sparsely populated, are seriously short of resources. See Table 4 and Table 5.

3.2.3. Theil Index Fairness Analysis

From 2019 to 2023, Theil index, where the resources of old-age care institutions in Southwest China are allocated according to the elderly population, is at a low level as a whole, indicating that the resources allocation at the provincial level is relatively balanced. The number of institutions for the aged and the number of beds at the end of the year in Theil index remain below 0.01 all the year round, which shows that the allocation of institutions and beds is highly matched with the distribution of the elderly population and is fair. The Theil index of the number of managers fluctuates between 0.0118 and 0.0194, which is slightly higher than the number of institutions and beds, reflecting that there is some imbalance in the allocation of human resources.

The number of professional and technical personnel in Theil index reached a peak of 0.0694 in 2019, and then decreased to 0.0194 in 2023 year by year, indicating that the unfairness in the allocation of professional personnel has been significantly improved, and the provinces have

gradually become balanced. Theil index's overall institutional building area is low, but it will increase slightly after 2021. It is necessary to pay attention to whether the expansion of building area in some areas is synchronized with the growth of the elderly population.

Generally speaking, the resources of old-age care institutions in Southwest China are continuously optimized according to the fairness of population allocation, and the imbalance of human resources allocation is improving, but managers still need to further optimize the layout to ensure the accurate matching of resources and needs. Theil index, which is allocated by geographical area, presents a completely opposite pattern. According to the table (geographical distribution), the t value of all resources is in the high range of 0.53~0.90: the t value of the number of old-age care institutions is 0.6458~0.6880, the number of beds at the end of the year is 0.5712~0.6051, the number of managers is 0.6177~0.6594, and the number of professional and technical personnel is 0.6679 ~ 0.9000. This shows that the geographical distribution of resources is extremely uneven and the fairness is extremely poor. Among them, the Theil index of professional and technical personnel is as high as 0.9038(2019), although it has dropped to 0.6679(2023) year by year, but it is still at a serious unfair level; The T value of the number of managers and institutions is also higher than 0.6 for a long time, reflecting that human resources and infrastructure are highly concentrated in economically developed and densely populated areas such as Chongqing and Sichuan, while resources in vast areas such as Xizang and Yunnan are seriously scarce.

Table 6. Theil index's situation of allocating resources of old-age care institutions by population in Southwest China from 2019 to 2023.

Time	Number of institutions for the aged (pcs)	Number of beds at year end (pcs)	Number of managers(No.)	Number of professional personnel(No.)	Institutional building area (sq. m.)
2019	0.0052	0.0069	0.0272	0.055	0.0098
2020	0.0047	0.0024	0.022	0.039	0.0017
2021	0.0062	0.0056	0.0157	0.0385	0.023
2022	0.006	0.0089	0.017	0.0345	0.0248
2023	0.0053	0.0109	0.0177	0.0253	0.0264

Table 7. Theil index's allocation of resources for aged care institutions by geographical area in Southwest China from 2019 to 2023.

Time	Number of institutions for the aged (pcs)	Number of beds at year end (pcs)	Number of managers(No.)	Number of professional personnel(No.)	Institutional building area (sq. m.)
2019	0.6634	0.5712	0.6594	0.9038	0.6201
2020	0.6458	0.5816	0.6423	0.854	0.6603
2021	0.688	0.6051	0.653	0.8181	0.6068
2022	0.6799	0.5807	0.62	0.7452	0.5567
2023	0.6753	0.5728	0.6177	0.6679	0.5303

By further comparing the Theil index of the two configurations, we can find that the population configuration T value is generally less than 0.03, while the geographical configuration T value is greater than 0.5, which is quite different. It reveals that the resource allocation of pension institutions in southwest China has achieved relative fairness in meeting the needs of the elderly population, but it faces severe challenges in realizing universal access in geographical space. See Table 6 and Table 7.

4. Discussion

Based on the data of China Statistical Yearbook and China Civil Affairs Statistical Yearbook from 2019 to 2023, this study systematically evaluates the fairness of resource allocation of pension institutions in five provinces (cities, districts) in southwest China from two dimensions of population and geography by using Gini coefficient and Theil index. The results show that the fairness of resources allocated according to the elderly population is good (Gini coefficient is mostly lower than 0.2, and Theil index is lower than 0.03), while the fairness of resources allocated according to geographical area is extremely poor (Gini coefficient is generally higher than 0.6, and Theil index is higher than 0.5). The pattern of population dimension fairness and geographical dimension imbalance has remained stable for five years, which shows that the core contradiction in the allocation of old-age resources in southwest China is not the total amount shortage or the imbalance of population matching, but the serious imbalance of spatial layout.

The Gini coefficient of the allocation of the elderly population is in a highly fair range with that of Theil index, in which the number of old-age care institutions and beds is the most balanced (Gini coefficient is 0.03~0.06), and the fairness of the allocation of professional and technical personnel is also improving year by year (Gini coefficient is reduced from 0.17 to 0.09). This result is consistent with the relevant domestic research conclusions, which shows that the total planning of old-age resources in Southwest China basically follows the principle of "allocation according to needs", and the resources investment keeps a good synchronization with the size of the elderly population in each province. Especially in Xizang Autonomous Region, although the total population is very small, due to the low base of the elderly population, the per capita index has improved significantly, which has not had a significant impact on population equity. The Gini coefficient of managers remains at about 0.09, slightly higher than other indicators, which may be related to the differences in management system and uneven distribution of administrative establishment in pension institutions in different provinces, suggesting that there is still room for optimization in refined management of human resources.

The Gini coefficient of all resources allocated by geographical area exceeds 0.6, and Theil index is as high as 0.5~0.9, which belongs to a highly unfair range. Among them, the geographical Theil index of professional and technical personnel reached 0.9038 in 2019, although it decreased to 0.6679 year by year, but it is still at a very high level. This result shows that the resources for the aged are highly concentrated in densely populated and economically developed areas such as Chongqing and Sichuan Basin, while the resource density in vast areas such as Xizang, northwest Yunnan and Guizhou mountainous areas is extremely low. There are three main reasons for this phenomenon: first, the construction of old-age care institutions is highly dependent on local finance and land supply, and economically developed areas have stronger investment capacity; Secondly, The current resource allocation standards are mostly based on the elderly population, such as the number of beds per thousand elderly people, and less geographical area and traffic accessibility are included in the assessment, resulting in the systematic neglect of sparsely populated but vast areas[5]; Third, professional and technical personnel tend to gather in big cities, which further aggravates the shortage of human resources in remote areas[6]. This unfair geographical dimension will directly lead to a significant increase in the threshold for the elderly in remote areas to actually obtain old-age services, which violates the policy goal of equalization of basic old-age services.

5. Conclusion

The above findings have clear policy implications for the construction of the old-age service system in Southwest China during the Tenth Five-Year Plan period: First, establish a resource allocation standard that takes into account the dual dimensions of population and geography,

and add assessment indicators for per capita resources in vast provinces such as Xizang and Yunnan, Second, Increase financial support for the construction of old-age care institutions and the directional training of professional and technical personnel in remote areas, and implement the old-age aid plan by drawing lessons from the health aid model in Tibet. Third, Promote the network layout of institution+community+home care for the aged within the province, improve the remote guidance ability by means of information technology, and alleviate the contradiction of geographical accessibility.

There are some limitations in this study: due to the difficulty in obtaining data at the municipal level, the internal differences among provinces cannot be decomposed by Theil index, which limits the accurate identification of unfair sources in the region; In addition, the forecast part is only based on time series extrapolation, without considering dynamic factors such as policy mutation or population flow. In the future, geographic information system (GIS) and micro-survey data can be combined to further reveal the actual obstacles of resource accessibility.

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